CLAIMS

1. A line-of-sight detection method of a subject using:

a first camera for measuring the position of a pupil relative to a coordinate system; a second camera having a light source arranged at a known position in the coordinate system and forming a corneal reflection center to obtain data of a size of vector r from the corneal reflection center to a pupil center and an angle ϕ of the vector r relative to a coordinate axis of the coordinate system; and a calculation means for calculating the line-of-sight direction for executing steps below based on information from each of the cameras, comprises the stages of:

determining a relational formula, including the steps of:

obtaining data on a coordinate point O of the position of a pupil of a subject with the first camera by making the subject gaze at on a known point G in the coordinate system;

obtaining, in the state of the subject, data of the corneal reflection center, a size of vector r from the reflection center to a pupil center P, and an inclination ϕ of the vector r relative to the coordinate axis with the second camera;

calculating an angle θ between a line connecting a reference position of the second camera and the pupil center and a line-of-sight of the subject by the calculation means; and

calculating a formula $\theta = f(r^*)$ showing a relationship between r^* related to r and θ based on the measured values and calculated value; and

determining a line-of-sight, including the steps of:

obtaining data on a coordinate point O' of the pupil position of

the subject with the first camera by making the subject gaze at an unknown point G' in the coordinate system;

obtaining data of the corneal reflection center, a size of vector r' from the reflection center to the pupil center P, and an inclination ϕ' of the vector r' relative to the coordinate axis with the second camera; and

calculating $\theta' = f(r^{*\prime})$ by using the relational formula to obtain the unknown point G' from the inclination ϕ' and θ'.

2. The line-of-sight detection method of the subject according to claim 1, wherein r^* is r itself or a corrected value of r based on OP, and $r^{*\prime}$ is r' itself or a corrected value of r' based on OP'.

3. The line-of-sight detection method of the subject according to claim 1, wherein the first camera is a stereo camera arranged by aligning a baseline in a horizontal axis direction of the coordinate system, and a light source of the second camera is constructed so as to provide an optical axis that is substantially aligned with that of the second camera.

4. The line-of-sight detection method of the subject according to claim 1, wherein the formula $\theta = f(r^*)$ showing the relationship between r^* and θ is given by $\theta = k \times r^*$ (where k is a constant).

5. The line-of-sight detection method of the subject according to claim 1, wherein the pupil is one of pupils of the subject.

6. A line-of-sight detection device of the subject, comprising:

a first camera for measuring a position P of a pupil relative to the coordinate system;

a second camera having a light source arranged at a known position in the coordinate system to obtain data of a size of vector r from a corneal reflection center to a pupil center illuminated by the light source and an angle ϕ of r relative to the coordinate axis; and

a calculation means for executing the steps of:

obtaining data on a coordinate point P of the position of a pupil of a subject with the first camera by making the subject gaze at a known point G in the coordinate system;

obtaining, in the state of the subject, data of the corneal reflection center, a size of vector r from the reflection center to a pupil center P, and an inclination ϕ of the vector r relative to the coordinate axis with the second camera;

calculating an angle θ between a line connecting a reference position of the second camera and the pupil center and the line-of-sight of the subject and calculating a formula $\theta = f(r^*)$ showing a relationship between r^* related to r and θ;

obtaining data on a coordinate point O' of the pupil position of the subject with the first camera by making the subject gaze at an unknown point G' in the coordinate system;

obtaining data of the corneal reflection center, a size of vector r' from the reflection center to the pupil center P, and an inclination ϕ' of the vector r' relative to the coordinate axis with the second camera; and

calculating $\theta' = f(r^{*\prime})$ from $r^{*\prime}$ related to r' by using the relational formula to further obtain the unknown point G' from ϕ' and θ'.

7. A three-dimensional view-point measurement device, comprising: two cameras, a first light source arranged near one of the

two cameras, a second light source arranged near another of the two cameras, a control means for controlling ON/OFF of the first light source and the second light source and obtaining an image signal in sync with ON/OFF, and a calculation means for extracting a pupil and corneal reflection from the obtained image signal.

8. A three-dimensional view-point measurement device, comprising: two cameras, a first light source arranged near one of the two cameras, a second light source arranged near another of the two cameras, a control means for controlling ON/OFF of the first light source and the second light source and obtaining an image signal in sync with ON/OFF, and a calculation means for extracting a pupil and corneal reflection from the obtained image signal and calculating a line-of-sight vector from these positions.

9. A three-dimensional view-point measurement device, comprising: two cameras, a first light source arranged near one of the two cameras, a second light source arranged near another of the two cameras, a control means for controlling ON/OFF of the first light source and the second light source and obtaining an image signal in sync with ON/OFF, and a calculation means for extracting a pupil and corneal reflection from the obtained image signal and calculating a three-dimensional position of the pupil from these positions.

10. The three-dimensional view-point measurement device according to claims 7 to 9, wherein the first light source and the second light source are configured to have an approximately identical emission wavelength.